

IX.—*Additional Notes on some British Carboniferous Lycopods*. By R. KIDSTON, F.R.S.E., F.G.S.*

[Plate IV.]

THE present paper must be regarded as an appendix to that published by me in the *Ann. & Mag. Nat. Hist.* in 1885 †. Since that communication was written several important works dealing with the Carboniferous Flora have appeared which contain additional information regarding the Carboniferous Lycopods. I have also continued my investigations on this subject, and now wish to lay before this society some of the results. These are partly confirmative of the views I previously stated and partly correcting errors into which I had fallen.

I. *Lepidodendron Veltheimianum*, Sternb.

A few months ago I received for examination from the Geological Survey of England an impression of *Lepidodendron Veltheimianum*, collected by Mr. Rhodes, one of their fossil collectors, from the Lower Carboniferous of Lumby Law Railway-cutting, $\frac{1}{4}$ mile north of Edlingham Church, Northumberland. It was contained in an iron-stained sandstone and showed on the surface of the impression the leaf-scars and one of the large cone-scars. Attached to this latter is the basal portion of the appendicular organ which had been imbedded in the matrix, and from the fortunate manner in which the block containing the specimen has split one side of the appendicular organ is exposed. It is directed upwards and therefore similar in position to that of all the other specimens of the plant which have shown the appendicular organ *in situ*. Owing to the rough nature of the matrix the minute structural points of this organ are not shown; but the impression of the fossil is sufficiently well preserved to enable a satisfactory identification of the species to be made, and, further, to confirm the opinion that the organ in question is a cone.

My thanks are due to Dr. A. Geikie for the opportunity of

* Read before the Royal Physical Society of Edinburgh, March 20, 1889.

† "On the Relationship of *Ulodendron*, L. & H., to *Lepidodendron*, Sternb., *Bothrodendron*, L. & H., *Sigillaria*, Brongn., and *Rhytidodendron*, Boulay," vol. xvi. pp. 123-139, 162-179, 239-260, pls. iii.-vii.

examining this fossil, which is contained in the collection of the Geological Survey of England.

I was previously of opinion that *Lepidodendron Veltheimianum*, in addition to bearing lateral cones which produced the large Ulodendroid scars, might also have produced terminal cones. Continued investigations have, however, led me to relinquish this view, as the cones which I formerly believed to be the terminal cones of *Lepid. Veltheimianum* I have now seen attached to their parent branches, which show that they belong to an altogether distinct and, I believe, an undescribed species.

Note.—I wish to correct an error in the description of the leaf-scar of *Lepidodendron* which I made in the paper already referred to. In my previous communication it was stated on p. 173, "Leaf-base attached to the whole area of the leaf-scar (including the 'field')." That portion of the leaf-scar which is known as the "field" really belongs to the cortical system, of which it is in fact a cushion-like elevation. The true leaf-scar is only the small shield-like disk which bears the vascular and the two lateral cicatricules. These two "lateral cicatricules" have no connexion with the vascular system and are probably glandular.

II. SIGILLARIA.

In my previous memoir I placed in *Sigillaria*, under the name of *Sigillaria discophora*, König, sp., the plant originally figured by König as *Lepidodendron discophorum* *. This is identical with Lindley and Hutton's *Ulodendron minus* †. My reason for placing this plant in *Sigillaria* was the structure of the leaf-scar, which I stated on p. 178 (*l. c.*) possessed, as had been figured by Sir William Dawson, a central and two lateral cicatricules ‡; and though I had not observed them personally I had no reason to doubt the accuracy of this writer's observation. In reviewing my paper Mons. Zeiller § gives his reasons for doubting the accuracy of the figure given by Dawson, in which the three cicatricules were shown,

* König, *Icones fossilium sectiles*, pl. xvi. fig. 194.

† I should say here that although this latter name is the older one, it has been so much confused by authors, expediency almost demands that it be subordinated to the name given by König, from the use of which no confusion or misunderstanding can arise.

‡ 'Acadian Geology,' 2nd ed. 1868, p. 455, fig. clxx. G³.

§ "Présentation d'une brochure de M. Kidston sur les *Ulodendron* et observations sur les Genres *Ulodendron* et *Bothrodendron*," Bull. de la Soc. Géol. de France, 3^e sér. vol. xiv. p. 168 (1885).

especially founding his opinion on the fact that Dawson states in the description of his species—*Lepidophloios parvus* = *Sigillaria discophora*—that the vascular points are obscure.

I received, however, in 1886 from the Rev. David Landsborough, Kilmarnock, to whom I am indebted for many instructive specimens of our Carboniferous Lycopods, a fragment of a large specimen of *Sigillaria discophora*, which was unfortunately broken into several pieces when removing it from the roof of the Whistler Seam, Kilmarnock. This example shows clearly the central and two lateral cicatricules of the leaf-scar. A small portion of the specimen is shown in Pl. IV. figs. 1, 1 a. This specimen conclusively proves that the leaf-scars of *Sigillaria discophora*, König, sp. (= *U. minus*, L. & H.), are provided with three cicatricules very similar to those of *Sigillaria*, in which genus I believe the plant under discussion should be placed. It is very remarkable that in such a common British Coal-measure fossil the true outer surface of the bark, showing the leaf-scars in a good state of preservation, is so seldom met with. One reason for this is the persistence of the leaves, which appear to have retained their attachment to the stem much longer than in the other Coal-measure Lycopods, and it is not uncommon to find the leaf-scars on stems of large specimens of *Sigillaria discophora* entirely obliterated by the foliage of the plant being closely adpressed to the bark.

I united *U. majus* and *U. minus*, L. & H.; but M. Zeiller regards them as distinct species, and has since figured a specimen which he believes to be the *U. majus* of Lindley and Hutton*, with which he unites *Sigillaria (Lepidodendron) discophora*, König. From the examination of a plaster cast of König's original specimen, which is still preserved in the collection of the British Museum, I feel quite satisfied that König's plant is beyond all doubt referable to *U. minus*, L. & H., and not to their *U. majus*, whatever may be the claims of *Ulodendron majus*, L. & H., to rank as a species. The size of the Ulodendroid scars or of the leaf-scars is of no specific value, and I have specimens of *Sigillaria discophora* in my own collection with Ulodendroid scars ranging up to $5\frac{1}{2}$ inches in their greater diameter. There is no Ulodendroid scar on the specimen of *U. majus* figured by Zeiller; of course this does not prove that his specimen does not belong to that species, but as the case stands, I at present believe that *U. majus*, L. & H., and *U. minus*, L. & H., are different ages and conditions of one species. I also feel cer-

* 'Flore fossile du bassin houiller de Valenciennes,' p. 481, pl. lxxiii. fig. 1.

tain that *Sigillaria Menardi*, Lesqx. (not Brongn.)*, which Zeiller unites with *U. majus*, is likewise referable to *Sig. discophora* (= *U. minus*, L. & H.). The type of *U. majus* appears to be lost, but the counterpart of the type of *U. minus* is still preserved in the Hutton Collection, Newcastle-on-Tyne, and on the careful examination of this my identifications have been made.

III. BOTHRODENDRON, L. & H.

Bothrodendron, L. & H., Fossil Flora, vol. ii. p. 1 (1833).

Rhytidodendron, Boulay, Le terrain houiller du nord de la France et ses végétaux fossiles, p. 39 (1876, Lille).

In 1885 I recorded the occurrence of *Rhytidodendron minutifolium*, Boulay, from Scotland, and regarded the genus as distinct from all others; but to M. Zeiller we are indebted for showing that *Rhytidodendron*, Boulay, is none other than *Bothrodendron*, L. & H. To the defective descriptions of Lindley and Hutton must be ascribed the cause of this genus being so imperfectly known; and had it not been for the discovery of an original specimen, communicated by Hutton to the Museum of Natural History, Paris, the cloud that enveloped this genus might have hung over it much longer †.

In M. Zeiller's memoir, to which I have already referred, he figures stems and branches of *Bothrodendron punctatum*, the latter having their foliage attached. Recently I have met with specimens of *B. punctatum* as also with additional examples of *B. minutifolium* in Britain. The latter species I have found in several new localities, and it is represented by stems and branches with their foliage attached. *B. punctatum* I have only yet seen from the Kilmarnock Coal-field, and for specimens of it I am again indebted to the Rev. D. Landsborough and to Mr. Blackwood, Kilmarnock.

The leaf-scars in this genus are very small and provided with three punctiform cicatricules. On the young growing branches the leaf-scars of some of the species are close and surrounded by a *Lepidodendroid*-like "field," but this entirely disappears on the larger stems where the leaf-scars are distant; the surface of the bark between the leaf-scars is beautifully ornamented by delicate lines and granulations.

* Geol. Survey of Illinois, ii. pl. xliii.

† I am greatly indebted to M. Zeiller for figuring at my request the authentic specimen of *Bothrodendron punctatum*, L. & H., which had been presented to the Muséum d'histoire naturelle by Hutton and to which reference has been made (Zeiller, *l. c.* pl. viii. fig. I).

In *Bothrodendron punctatum* the fruit has evidently been borne in lateral cones, from which originate the two vertical rows of large Ulodendroid scars; and one marked feature which distinguishes the large scars of *Bothrodendron* from those of the other Ulodendroid Lycopods is that in *Bothrodendron* the umbilicus of the large scar is eccentric, whereas in the Ulodendroid *Sigillaria* and *Lepidodendra* the umbilicus is central or approximately so.

In *Bothrodendron minutifolium*, Boulay, sp., the fruit is borne in long narrow cones at the terminations of the branches. The only specimen of the fruit of this genus which I have yet seen was collected by Mr. W. Hemingway at Monkton Main Colliery, near Barnsley, Yorkshire, in shale over the "Barnsley Thick Coal." This specimen he has kindly forwarded to me for examination. The cone is attached to a stem which still bears the foliage of the species. Unfortunately the cone is imperfect in its upper part, so its full length cannot be determined. The portion preserved is $3\frac{1}{2}$ inches long and at its thickest part rather over $\frac{1}{2}$ inch wide. The central axis in the compressed cone is seen to give off at right angles a number of transverse bars, which probably represent the basal portions of the bracts that bore the sporangia. Their leafy extension rises up at almost right angles to their basal portion, and is therefore nearly parallel with the axis. These bracts are closely placed, as many as eleven being contained on the axis in the space of half an inch. The specimen is shown nat. size in Pl. IV. fig. 6.

I have received a very interesting specimen of a portion of a stem of *Bothrodendron minutifolium* from Mr. Landsborough. The lower part of this specimen is decorticated and shows the subepidermal leaf-scars. These are not simple as supposed*, but when well preserved are seen to consist of two linear elongated elevations, which are frequently connected in the centre, as shown in figs. 5 and 5*b*. They are very similar to those of *Sigillaria*.

The foliage of *B. minutifolium* and *punctatum* is very small and the ultimate ramifications of the dichotomously divided branches have great similarity to those of recent Lycopods, as has been pointed out by Zeiller. Their systematic position is, however, probably intermediate between *Lepidodendron* and *Sigillaria*.

The genus *Bothrodendron* is not, however, restricted to the Coal-measures, for I have received from various localities in the Calcareous-Sandstone series specimens of a species of this genus, which I here describe.

* Zeiller, *l. c.* p. 181.

Bothrodendron Wükianum, Kidston, n. sp.
(Pl. IV. figs. 2-4.)

Cf. *Lepidodendron Wükianum*, Heer, Foss. Flora d. Bären Insel, p. 40, pl. vii. fig. 1 c, pl. viii. fig. 2 c, pl. ix. fig. 1.

Description.—Leaf-scars distant, small, varying in size according to the age of the branch, transversely oval. Cicatricules three, punctiform, situated towards the lower margin of the scar. Above the leaf-scar is a small punctiform cicatricule. Surface of the bark between the leaf-scars irregularly striated longitudinally, the striæ bending round the scars and leaving in their immediate neighbourhood a smooth space.

Remarks.—The leaf-scars vary in size and distance apart according to the age of the specimen. In my smallest example they are about 1 millim. and in the largest specimen 3·5 millim. in transverse diameter. On the young branches the little punctiform cicatricule is immediately above the leaf-scar and seems to rest upon it; but in the largest specimen of the species that I have seen it is separated from the leaf-scar by a short distance.

The bark is longitudinally striated, the striæ being slightly bent, especially in the neighbourhood of the leaf-scars round which they curve, and immediately below and above the leaf-scars they are absent, having the appearance as if they had separated to make room for the scars. There is, however, no "field," as in *Lepidodendron*.

I have named this species "*Wükianum*" as there seems to be a great probability that this plant is similar to Heer's *Lepidodendron Wükianum*, from Bear Island*. The British specimens are not, however, referable to the genus *Lepidodendron*, and, judging from Heer's figures and description, I do not think that his plant should be placed in that genus. As, however, I have not seen any of Heer's specimens, I cannot be certain that his species is identical with my *Bothrodendron Wükianum*, though I am strongly inclined to believe it is. I therefore, while adopting his specific name, place the British specimens in their proper genus; and should it eventually be proved that these two species are identical, it will be an easy transition to substitute *Bothrodendron Wükianum*, Heer, sp., for *Bothrodendron Wükianum*, Kidston.

Localities. Railway-cutting between Boags Mill and Kates

* In Kongl. Svenska Vetenskaps-Akademiens Handlingar, Band ix. no. 5 (Stockholm, 1871).

Mill, Water of Leith, Midlothian; collected by Mr. James Bennie. Wardie, near Granton, Midlothian; collected by Dr. J. M. Macfarlane, F.R.S.E. Little Whickhope Burn, near first branch above Cross Sike, Northumberland; communicated by Mr. H. Miller, F.R.S.E.

Horizon. Calciferous Sandstone Series.

In my 'Catalogue of Palæozoic Plants in the Collection of the British Museum' * I stated the belief that the leaf-scar of *Cyclostigma*, Haughton †, did not differ in any character from those of *Rhytidodendron*, which is now known to be synonymous with *Bothrodendron*. Last year I had the opportunity of examining the fine collection of Kiltorkan fossils in the Science and Art Museum, Dublin, and in the collection of the Geological Survey of Ireland, Dublin, and this has confirmed my opinion that *Cyclostigma* should be merged in *Bothrodendron*.

The fructification of the Coal-measure *Bothrodendron* is but imperfectly known, and, so far as I am aware, the only cone identified with the Coal-measure members of the genus is that with short bracts figured in this communication. The cones, however, of the *Cyclostigma kiltorkense* are provided with long, linear, lanceolate bracts with a subtriangular base, on which the spores are borne. These have been figured by Schimper as *Lepidostrobis Baillyanus* ‡. Their whole structure reminds one much of Sigillarian cones.

At present so little is known about the fructification of the various species of *Bothrodendron* that on this important point a comparison cannot be made between the members of the genus; but so long as the generic characters of these Lycopods are founded on the structure of the leaf-scar, *Cyclostigma* must be enrolled in the older genus *Bothrodendron*.

I am aware that the description of the leaf-scar of *Cyclostigma* that I now give differs in some important points from that given by Dr. Haughton § and by Heer ||, as also from the figures and descriptions given by this last-mentioned author in his 'Fossile Flora der Bären Insel;' but in many of the specimens a certain amount of shrinkage appears to have taken place which may have reduced the leaf-scars to the condition in which many of them occur. Be this as it may, the fact remains that when well-preserved examples

* P. 236.

† Ann. & Mag. Nat. Hist. ser. 3, vol. v. p. 443 (1860).

‡ Traité d. paléont. végét. vol. ii. p. 71, pl. lxi. fig. 9.

§ L. c. p. 13.

|| Quart. Journ. Geol. Soc. vol. xxviii. p. 169, pl. iv.

are examined it is found that the leaf-scars of *Cyclostigma* contain three cicatricules similar to those of *Bothrodendron*.

EXPLANATION OF PLATE IV.

- Fig. 1.* *Sigillaria discophora*, König, sp., nat. size. 1 *a.* Leaf-scar enlarged and showing the three cicatricules. *Loc.* Shale over Whistler Seam, Bonnington Pit, Kilmarnock. Communicated by the Rev. David Landsborough. *Hor.* Lower Coal-measures.
- Figs. 2-4.* *Bothrodendron Wukianum*, Kidston, n. sp. 2. *Loc.* Little Whickhope Burn, near first branch above Cross Sike, Northumberland; nat. size. 2 *a.* Leaf-scar, enlarged. *Hor.* Calciferous Sandstone Series. Communicated by Mr. H. Miller, F.R.S.E. 3. *Loc.* Railway-cutting between Kates Mill and Boags Mill, Water of Leith, Midlothian. *Hor.* Calciferous Sandstone Series. Collected by Mr. J. Bennie. Nat. size. Specimen in the Collection of the Geol. Survey of Scotland. 3 *a.* Leaf-scar, enlarged. 4. *Loc.* Shore, Wardie, Midlothian. *Hor.* Calciferous Sandstone Series. Nat. size. Collected by Dr. J. M. Macfarlane. 4 *a.* Leaf-scar, enlarged.
- Figs. 5-6.* *Bothrodendron minutifolium*, Boulay, sp. 5. *Loc.* Shale over Whistler Seam, Bonnington Pit, Kilmarnock. *Hor.* Lower Coal-measures. Nat. size. Communicated by the Rev. D. Landsborough. 5 *a.* Leaf-scar, enlarged. 5 *b.* Subepidermal cicatricules, enlarged. 6. *Loc.* Shale over "Barnsley Thick Coal," Monkton Main Colliery, near Barnsley, Yorkshire. Middle Coal-measures. Collected by Mr. W. Hemingway. Nat. size.

X.—On a new Genus of *Macrura* (*Ophthalmeryon transitionalis*). By C. SPENCE BATE, F.R.S.

[Plate IX.]

SOME short time since a small and much battered Crustacean was sent to me by Mr. George Merritt, with the request that I would inform him what it was. It proved to be new, and I propose to call it *Ophthalmeryon transitionalis*.

Unfortunately the specimen had been swallowed by a dolphin, and had therefore been affected somewhat by the gastric juices of the fish's stomach. Having been preserved in a dry condition, it was consequently very brittle and not in a state fit for examination. I therefore placed it for several weeks in a preparation of glycerine &c. to preserve and soften its texture before subjecting it to the risk of observation.

Its general appearance is that of a small Brachyurous Crustacean somewhat allied in form to *Ebalia* in its dorsal aspect. The carapace is about 9 millim. long and as many